tive results are sought, but the difficulties of obtaining them are recognized and the usefulness of quantitatively expressed results that may not be accurate in themselves but still may permit of valuable comparison with one another, is admitted. The reader feels throughout no impulse on the part of the author to fix standards but merely that desire to give help, out of his own rich but painfully accumulated experience, which led him to prepare the book. Any one who comes to this book for a rigorous method that will enable him to turn out orthodox studies of sedimentary rocks will be disappointed, but those who want to help in advancing the borders of knowledge about this subject will find guidance and inspiration. The methods of analysis are grouped under three heads—physical, microchemical and chromatic. The physical analysis includes different processes sometimes grouped in this country under mechanical analysis, and the preparation of thin sections which in dealing with weakly bound sedimentary rocks often calls for special methods. The demonstration of the ease of application and delicacy of microchemical analyses is one of the outstanding features of the book. Under chromatic analysis the author discusses various methods of staining. In the discussion of all these methods he selects, weighs, evaluates and contributes on the basis of his own experience, without attempting any formal completeness.

Perhap Cayeux's greatest achievement is the interest he is able to give to his discussion of the minerals of sedimentary rocks, of which of course he considers only the more common, both essential and accessory. It is in this part of the book that his treatment of the subject as natural history is illustrated in the most novel and interesting way. The individual mineral is to the author a record of environments—of the environment in which it originated and of those through which it subsequently passed—and it therefore contributes to the reconstruction of the history and geography of the past.

The last part of the book deals with the remains of organisms as constituents of the rocks. Needless to say, specific determinations of organisms are not the purpose of a treatise on petrography. But here, too, the problem of past environment as recorded by the remains, both as remnants of once living organisms and as mineral substances, is the object of study. This part therefore deserves the attention of paleontologists as well as of petrographers and stratigraphers.

Vivified throughout by the author's own experience the work must lack that perfect completeness that would assure it against being found defective in the treatment of some special topics or methods that may be in favor with individual readers. But every reader will surely be glad to accept these omissions for the sake of the vigor and readibility that go with them. American petrographers, for instance, will be struck by the absence of any discussion of the use of liquids of known indices of refraction in the determination of minerals. But as compensation they may profit by adopting some of the elegant microchemical tests described, which have the advantage that they can often be applied directly to the thin section and do not require the disintegration of the rock. Likewise the suggestions given on pages 305 to 309 for the determination of minerals by their general appearance may be a valuable antidote to the habit into which the devotee of "index liquids" is likely to fall, of resorting to his liquids in blind routine, just as the man with the slide rule habit gets out his machine to find the product of 2×2.

The physical quality of the book is worthy of its subject matter, and it is a fact for contemplation and an honor to the fine French scientific spirit, exemplified by the entire work, that it bears the date 1916.

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SPECIAL ARTICLES

NOTES ON THE OCCURRENCE OF GAMMERUS LIMNAEUS SMITH IN A SALINE HABITAT

The capacities of various organisms for withstanding relatively wide ranges of environmental conditions has received considerable

attention at the hands of physiologists and students of animal behavior, and is a problem which must ultimately be considered in greater detail by ecologists, students of geographic distribution and organic evolution.

The purpose of this note is merely to call attention to the occurrence of *Gammerus limnaeus* Smith,[1] normally a fresh water[2] species, in a peculiar and rather saline habitat.[3]

In the summer of 1920 the writers visited the Ice Spring Craters lava field of the Sevier Desert in the ancient Lake Bonneville basin described in detail by Gilbert.[4] On climbing down into the old lava vent[5] of the Terrace crater we were surprised to find a small crustacean abundant in the small pool of clear water at the bottom. It was noted that a number of the animals were very slightly pigmented, apparently indicating that in the semi-darkness of the pool they were approaching cave conditions. In all instances, however, the eyes were fully pigmented. The presence of the *Gammerus* led to the assumption that the water was non-saline and we were preparing to replenish our water bag when taste showed it to be distinctly brackish.

A sample of the water was therefore taken in a clean Mason fruit jar from which it was afterwards transferred to citrate bottles for shipment to the laboratory. The water had a freezing point lowering of 0.410° C., indicating an osmotic concentration of 4.94 atmospheres and an electrical conductivity of .0138 reciprocal ohm. The hydrogen ion concentration of the water (determined electrometrically) was $C_H = 0.409 \times 10^{-7} = p^H 7.388$. Analysis showed the following composition.

	Grams per Liter
Total solids (at 110°)..	8.5666
Total solids (at 210°)..	8.1467
Total solids (ignited)[6]..	7.6400
CO_3[7]	none
HCO_3[7]	0.2187

Mineral Analysis

	Grams per Liter	Per Cent. of Total Solids (Ignited)
SiO_2	0.0720	0.94
$Fe_2O_3Al_2O_3$	0.0030	0.04
Ca	0.3305	4.33
Mg	0.2560	3.35
Na	1.9750	25.85
K	0.3050	3.99
Cl	3.4120	44.66
SO_4	1.3260	17.36
CO_3[8]	0.1075	1.41
Total	7.7870	101.93

[1] We are indebted to Mr. Waldo L. Schmitt, associate curator of marine invertebrates in the U. S. National Museum, for the determination of the species. The specimens are in the National Museum.

[2] The key to the taxonomic and distributional literature is furnished by Weckel's paper on the fresh water Amphiopoda of North America (*Proc. U. S. Nat. Mus.*, 32: 42–44, 1907), and individual citations need not be given here. The species was first dredged in Lake Superior. It has been taken near Long's Peak, Colorado, at an elevation of 9,000 feet; from a cool spring, Fire Hole Basin; from Shoshone Falls, Idaho; Flathead Lake, Montana; and from the Yellowstone National Park. It is reported from Fort Wingate, N. M., and from the Wasatch Mountains and Salt Lake City, Utah. It is impossible to determine from the records whether all the localities were fresh water habitats, but that it is typically a fresh water form can admit of no possible doubt. It has been taken from the stomachs of trout from brooks near Marquette, Mich.

[3] The genus *Gammerus* has species which occur in more or less saline coastal habitats and in non-saline inland waters.

[4] Gilbert, G. K., "Survey West of the 100th Meridian," Vol. 3, pp. 136–144; also "Lake Bonneville," Monographs U. S. Geol. Survey, I., pp. 320–325, 1890.

[5] The lava vent is a circular tube, at one side of the wide crater, about 12 feet in diameter inclined 10° or 15° from the vertical. It can be explored for about 25 feet when progress is stopped by water.

[6] There was apparently considerable organic matter in solution. This could easily be derived from bat guano which was observed on the lava ledges surrounding the pool.

[7] Carbonates and bicarbonates were determined by the titrametric method proposed by Scales (SCIENCE, N. S., 51, p. 214, 1920).

[8] Calculated from bicarbonate data according to the formula $2RHCO_3 + \text{heat} = R_2CO_3 + CO_2 + H_2O$.

Hypothetical Inorganic Composition of the Solution

	Grams per Liter	Per Cent. of Total
Na_2SiO_3	0.1460	1.84
$Ca(HCO_3)_2$	0.2913	3.68
$CaSO_4$	0.8780	11.08
$MgSO_4$	0.8855	11.18
$MgCl_2$	0.3023	3.81
KCl	0.5875	7.42
NaCl[9]	4.8330	60.99
Total	7.9236	100.00

The Terrace crater, and indeed all of the craters of the Ice Spring Craters group, is unquestionably post-Bonneville in origin. There is no trace of wave work on the outer slopes of the craters such as are so conspicuous on Pavant Butte to the north, and neither lacustrine sediments nor evidences of subaqueous erosion appear on the surface of the evidently recent lava fields as they do on the Fumarole Butte lava field to the northwest.

The depth of the vent of the Terrace crater is 260 feet below its general rim and 220 feet below the sill of the last outflow. The problem of the original introduction of *Gammerus* into the small pool of water occupying the bottom of this crater is that of the transportation of small crustacean species or their eggs in general. The point of physiological interest is the occurrence of this species, hitherto reported from non-saline waters, in water of this concentration.

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[9] An average value based on NaCl contents of 4.8790 gr. calculated from residual Na and 4.7870 calculated from residual Cl. The difference of 0.092 gram per liter is within experimental error when one remembers that the above calculations are purely empirical and also when one considers that in some instances the actual analytical values, and consequently accompanying experimental errors, were multiplied by 50 to bring the calculation to a liter basis.

AN EYELESS DAPHNID, WITH REMARKS ON THE POSSIBLE ORIGIN OF EYELESS CAVE ANIMALS

During the past nine years vast numbers of Cladocera of several species have been reared in the writer's laboratory. For one purpose or another many thousands of these have been examined with the microscope. About a year ago was found the only marked aberration of the eye structure which has been noted. This was a *Simocephalus* without any trace of an eye.

Unfortunately this individual was discovered among the small number just killed for use in making some permanent slide mounts. The killing of this individual was unfortunate in that a Cladoceran when killed becomes somewhat opaque while the live animal is so transparent that internal structures can be clearly distinguished. Nor was the differentiation so good in the completed mount as in a live animal. It was clear however both in the freshly killed specimen and in the mount that not only the eye pigment but the entire eye structure was lacking. The ocellus was present and normally pigmented. While it is not quite demonstrated in the mounted specimen it is probable that the optic ganglion is normally developed in the eyeless individual.

It is a source of keen regret to the writer that this eyeless individual was not discovered alive so that offspring could have been obtained from it and light thrown on the nature of the peculiarity, whether of genetic consequence or merely an accident in development. No eyeless individuals were found among sibs and many offspring of sibs of this eyeless individual. This fact however does not convince one that eyelessness in this case may not have been inheritable, since in these prevailing parthenogenetic forms there is no chromatic reduction in the maturation of the egg and hence no segregation of characters is expected. If the eyeless condition of this individual were due to a mutation its descendants should have been eyeless, but un-